croup. The drug's long half-life of 36 to 54 hours allows for a single-dose regimen. Equipotent doses of another corticosteroid given orally, intravenously, or intramuscularly could also be expected to improve the outcome, but there are fewer data supporting various alternative regimens than those for single-dose dexamethasone given intramuscularly.

The role of corticosteroids in emergency department management of croup may expand in the future to include the use of nebulized corticosteroids. Nebulized budesonide, a synthetic glucocorticoid with relatively strong topical anti-inflammatory effects and low systemic activity has recently been shown to allow earlier discharge from an emergency department and a reduced rate of subsequent hospital admissions compared with placebo. An advantage of this therapy is its relatively rapid onset of effect; improvements can be seen as early as an hour after administration. The exact role of this new therapy for croup, however, remains to be determined.

BEVERLY H. BAUMAN, MD
Los Angeles, California

GARY VILKE, MD
THEODORE CHAN, MD
San Diego, California

REFERENCES

Cruz MN, Stewart G, Rosenberg N: Use of dexamethasone in the outpatient management of acute laryngotracheitis. Pediatrics 1995; 96:220-223

Klassen TP, Feldman ME, Watters LK, et al: Nebulized budesonide for children with mild-to-moderate croup. N Engl J Med 1994; 331:285-289

Ledwith CA, Shea LM, Mauro RD: Safety and efficacy of nebulized racemic epinephrine in conjunction with oral dexamethasone and mist in the outpatient treatment of croup. Ann Emerg Med 1995; 25:331-337

Ottawa Ankle Decision Rules

THE REVISED OTTAWA ankle and foot rules are simple, specific guidelines used to assist physicians in deciding which blunt ankle and foot injuries require radiographs to exclude fracture. With less than 15% of ankle injuries resulting in substantial fracture, the objective is to eliminate radiographs in patients with injuries with a low probability of fracture. The rules assume a patient has a normal level of consciousness and no competing pain.

The criteria for ankle radiographs are pain in the malleolar area plus one or more of the following:

- Bone tenderness at the posterior edge of the distal 6 cm or tip of the lateral or medial malleolus, or
- Inability to bear weight both immediately after the injury and in the emergency department. Weight-bearing is defined as the ability to take four steps, two on each foot, with or without a limp.

The foot rules require pain in the midfoot plus one or more of the following:

- Bone tenderness at the base of the fifth metatarsal or navicular, or
- Inability to bear weight immediately after the injury and in the emergency department, as described above.

Large studies assessing these rules have shown a 100% sensitivity in identifying important fractures. Fractures are defined as bone fragments greater than 3 mm in breadth, a size that makes a patient a more likely candidate for rigid immobilization. The rules have safely allowed the reduction of the number of emergency department radiographs of the ankle and foot by close to 30%. This leads to a reduction in time spent in the emergency department, less cost for the visit by eliminating the radiographs, and less radiation exposure to patients. This has been accomplished without compromising patient satisfaction when an effort is made to educate the patient on why a radiograph is not necessary.

Some smaller studies have questioned the sensitivity of the rules when used by health care providers other than emergency department physicians. When residents, nurses, physician assistants, interns, and medical students are included, however, the sensitivity remains at more than 93%. A thorough education process is necessary, including access to simple diagrams to ensure accuracy in applying the rules.

Other criteria often empirically thought to add important data points, such as mechanism of injury, a "cracking" sound, ecchymosis, decreased range of motion, a positive drawer sign, soft-tissue tenderness, and proximal fibular tenderness, do not prove to be helpful in increasing the sensitivity of the selection criteria.

The ankle part of the study has been validated in a small group of children (68 patients with 14 fractures), aged 2 to 18 years, again finding 100% sensitivity and a 25% decrease in the number of radiographs.

The rules have not been validated for use in pregnant patients, but there is no reason to expect that they would not apply as effectively. Furthermore, a reduction in radiation exposure would seem to be a particular benefit of the rules in these patients.

These decision rules, while having a low specificity, do not miss important fractures. Despite their implementation, about 77% of ankle radiographs are still negative for fracture. The rules are substantially better at identifying patients with fractures than are physicians applying personal clinical criteria.

LESLIE MILNE, MD
San Diego, California

REFERENCES

Chande VT: Decision rules for roentgenography of children with acute ankle injuries. Arch Pediatr Adolesc Med 1995; 149:255-258

Kerr L, Kelly AM, Grant J, et al: Failed validation of a clinical decision rule for the use of radiography in acute ankle injury. N Z Med J 1994; 107:294-295

Lucchesi GM, Jackson RE, Peacock WF, Cerasani C, Swor RA: Sensitivity of the Ottawa rules. Ann Emerg Med 1995; 26:1-5

Pigman EC, Klug RK, Sanford S, Jolly BT: Evaluation of the Ottawa clinical decision rules for the use of radiography in acute ankle and midfoot injuries in the emergency department: An independent site assessment. Ann Emerg Med 1994; 24:41-45

Stiell IG, Greenberg GH, McKnight RD, et al: Decision rules for the use of radiography in acute ankle injuries—Refinement and prospective validation. JAMA 1993; 269:1127-1132

Stiell IG, Greenberg GH, McKnight RD, Nair RC, McDowell I, Worthington JR: A study to develop clinical decision rules for the use of radiography in acute ankle injuries. Ann Emerg Med 1992; 21:384-390

Stiell IG, McKnight RD, Greenberg GH, et al: Implementation of the Ottawa ankle rules. JAMA 1994; 271:827-832